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THE SEARCH FOR COUGARS IN THE EASTERN UNITED STATES

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ABSTRACT: The history of the demise of the eastern cougar (*Felis concolor couguar*), and evidence for its possible continued existence, are summarized. The study being reported on included wide-reaching searches for sign. Only one track and one scat that are suspected to have been made by cougars were produced. Reports of hundreds of sightings, screams, and tracks were received as the result of publicity generated by the study, but in only five cases has there been accompanying substantial evidence indicating that a cougar was present. Repeated searches of these areas to confirm the presence of cougars were unsuccessful, leading to the conclusion that the animals involved were transients, or that the original evidence may have been incorrectly interpreted. The "probability of non-detection" and the implications of this project for other areas of cryptozoology are discussed.

INTRODUCTION

Few subjects are more controversial among professional wildlife managers and biologists in the eastern United States than the potential occurrence of the cougar or panther (*Felis concolor*). Many people, including several biologists, have reported seeing cougars at close range, but none have been able to produce convincing supportive evidence of these sightings. Many cougars have been reported killed within the past 80 years, but few of these reports have been confirmed because specimens were not preserved. Even so, the federal government added the eastern subspecies to the Endangered Species List in 1973. The controversy came to a head in 1977 when several groups threatened to bring suit against the U.S. Forest Service (USFS) unless it halted the harvest of timber in Nantahala National Forest, where several cougars had reportedly been seen. Subsequently USFS and the U.S. Fish and Wildlife Service (USFWS) jointly sponsored the study being reported here. I shall discuss the history of eastern cougars and cougar habitat, and the effort that has been made during the past several years to confirm their presence. This paper updates information presented at the Non-Game and Endangered Wildlife Symposium, held in Athens, Georgia, in August of 1981.

HISTORICAL REVIEW

The eastern subspecies of the cougar (*Felis concolor couguar*) disappeared from most areas soon after settlement by European immigrants. Settlers

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feared the cougar and were reluctant to share their livestock and game with it. They were easily hunted with dogs, and many were killed. Bounties were paid for killing them in several states.

Early settlers also killed deer, the mainstay of the cougar's diet. With the exception of a few inaccessible mountain ranges and coastal swamps, deer were greatly reduced in numbers or extirpated from most sections of the eastern United States by the late 1800's. Deer did not become widespread again until they were extensively stocked and protected in the 1930's, 1940's, and 1950's.

There was, however, one notable exception to the widespread extirpation of deer. In the 1890's, George Vanderbilt purchased a huge tract of land near Brevard and Asheville, North Carolina, and protected the few remaining deer there. The herd grew large enough to experience a disease dieoff in 1908, and contained an estimated 1,000 deer in 1916 (Ruff 1938). Deer persisted, but probably were not abundant, in other isolated areas, notably in what is now Great Smoky Mountains National Park.

The Weeks Act of 1914 authorized the purchase of lands to form the National Forests. That provided renewed seclusion and protection for cougars. Hunting continued on most of these lands, but was better controlled than when it was privately owned. The Pisgah Game Preserve (part of Vanderbilt's estate) was incorporated into Pisgah National Forest.

Great Smoky Mountains National Park was established in the 1930's. Although 4,252 people were moved from the park, it was historically the least accessible large tract of land in the Appalachians, and was never devoid of deer and bear (Culbertson 1977). Hunting in the park was restricted in 1930, and halted altogether in 1934. The area was so inaccessible that about 30 percent was never logged. By the early 1900's, other large tracts of land in the East also had begun the trend toward fewer people and more deer.

There is evidence that a few cougars survived the most crucial period, which probably was before 1900 in the vicinity of Mt. Pisgah, and as late as 1930 in Great Smoky Mountains National Park. Table 1 contains all reports that I could find of cougars reported killed since 1900 in the eastern United States north of Florida (the only eastern state with a recognized panther population). Most of these reports cannot be confirmed, and, therefore, should be accepted cautiously, if at all. Several reports that are known to be false (at least two were intentional hoaxes) are included to illustrate the hazards attendant to accepting reports not supported by substantial evidence. Nevertheless, as many as 20 cougars may have been killed in or near the mountains in Georgia, Alabama, Tennessee, North Carolina, and South Carolina during the last 50 to 80 years. If cougars survived the critical period, they may have even experienced an increase in number in the more inaccessible areas as deer herds became larger and more widespread.

Several people have argued that an increase in the number of cougars killed should have been noticed if the population had increased. The removal of permanent human dwellings, the decreased need and opportunity to prey on livestock, and the passage and observance of laws protecting endangered species could account for the low kill rate. However, if all unverified kill reports of the 1970's and 1980's (Table 1) are true, the number is impressive.

Not all observers accept a kill as evidence that a wild cougar existed. Cougars breed readily in captivity, and kittens, in demand as pets, quickly outgrow the "cute, cuddly, and easy to feed" stage, and some possibly are released into the wild. Former owners will not admit releasing the animals because release is illegal in most areas, and they do not wish to be liable for any damage they cause. Determining whether a kill involved a wild or a formerly captive (feral) cougar can be resolved only be detailed skull measurements, or by performing parasite studies, such as those done in West Virginia in 1976 (see Table 1).

Recent Reports

The list of kills in Table 1 is fairly good evidence that cougars survived the most critical time, but it is poor evidence for their continued existence today because each one could have been the last survivor in that locality. Eyewitness reports still seem to be the strongest evidence of the continued existence of cougars, but there is reason to question the reliability of these sightings. Several reports, however, have been made by persons with biological training and experience, who should not be mistaken in their identification. Unfortunately, only one report by a naturalist was received in time to search for sign; in that instance I found cougar-sized scratch-hills, but only tracks of dogs and bobcats.

The need to receive reports while the sign is fresh is even more important if the person who reported seeing the cougar is untrained. I solicited fresh reports in eight national magazines, in many local newspapers and state conservation magazines, and in letters to each resource agency employee in the Southern Appalachians. Fresh reports have also been actively solicited by cooperators in Pennsylvania, Massachusetts, Maryland, Virginia, North Carolina and other states. Each of these efforts was successful in shortening the lines of communication and getting news of several sightings to the investigator while the sign was fresh, but no one has yet found unmistakable evidence of a cougar.

Some investigators regard the clustering of reports in certain areas to mean these areas contain cougars. Culbertson (1977) noticed that sighting locations in Great Smoky Mountains National Park correlated well with the clustered distribution of deer. I, too, usually make note of the amount of deer sign in the area of a sighting report. This does not mean that I consider clusters of sightings around deer herds to mean there are cougars there; the witnesses may have been seeing deer, not cougars. The problem is, how does one tell

TABLE 1.—Listing of cougars reported killed in the eastern United States, north of Florida, since 1900. Included are a few reports that were checked and found to be false, as a reminder that some people purposely make false reports (and others are mistaken even when the animal is in their possession). Many others could not be checked for authenticity.

Georgia

1903—Bulloch County (Statesboro). Mounted specimen displayed, photo filed at University of Georgia (Golley 1962).
1925—Harper (1927) mentions one killed in southern part of Okefenokee Swamp.
1927—89-year-old Bill Freeze of Ellerbe, N.C., told Downing about killing one that threatened to attack him while frog hunting between Toccoa, Georgia, and Madison, South Carolina. He was of the opinion that it had escaped from a wrecked circus train. Freeze had western cougar experience.
Mid-1960's—Malcolm Edwards has photo of young African lion claimed to have been killed by two deer hunters near Blue Ridge. Rumored to have been a pet, but became unmanageable and was destroyed.
1975—Nowak (1976) mentions an unconfirmed kill near Stockbridge in Henry County.
1979—Hunters claimed photo of them with a cougar in the mountains was a hoax designed to frighten hikers away from the area. Hoax claim may have been a coverup.
1980—Rumor of 93-lb. female being killed near Rincon (north of Savannah) could not be confirmed by enforcement agents.
1980—Downing has second-hand report that a man in northwest Georgia has killed three there in his lifetime.
1980's—Rumor of cougar being killed near Clayton.

Alabama

1921—Howell (1921) reported a specimen from near Blakely (county unknown).
1942—Article by Hardison (1976) quotes Fred Barkalow that a 109-lb. cougar was killed in TVA lakes region of northern Alabama. Mentions that this was the same year Fontana Dam was built, and that several were flushed while clearing lake bed (200 miles from kill site).
1948—Many authors cite one killed March 16 west of Asheville in St. Clair County. Also weighed 109 lb.
1953—One killed at Lock 14 in Tuscaloosa (Holliman 1963).
1956—Some confusion—Jenkins (1971) says one was killed in north Alabama near Georgia line, Golley (1962) seems to quote from *Alabama Conservation* that it was killed in Dale County in southeastern Alabama.

Mississippi

1900—Horan's (1976) map shows a kill in north-central Mississippi.

Louisiana

1905—Specimen in U.S. National Museum collected near Vidalia, Concordia Parish.
1931—Lowery (1936) reported one killed at Waverly, Madison Parish.
1965—One killed (preserved) near Keithville, Caddo Parish, now at Museum of Zoology, Louisiana State University.
1980–81—Bill Yenkes' 1982 master's degree thesis mentions two cougar kills.

Arkansas

1948—One killed near Mena, Polk County (Nowak 1976).

TABLE 1.—Continued.

1969—Large male killed 6 miles east of Hamberg, Ashley County. Specimen at Museum of Zoology, Louisiana State University.
1975—A 118-lb. male killed in Logan County. Mounted specimen in Arkansas Game and Fish Commission offices.
1979—Phone call to Downing reported finding a dead cougar. Barkley investigated and found it was a dog.

Oklahoma

1968—Lewis (1969) reported one killed 10 miles west of Checotah, Oklahoma, about 60 miles west of Fort Smith, Arkansas. Skeleton is at Oklahoma State University.
1975—Nowak (1976) cites an adult found dead near Stringtown, Atoka County, in southeastern Oklahoma.

Missouri

1927—Schwartz and Schwartz (1959) reported one killed.

Iowa

1909—Bowles (1971) listed a kill this date, but doubted its authenticity.

Tennessee

1929—Allen (1942) mentions one killed in the Holston Mountains, Johnson County.
1941—Culbertson (1977) claims Glen Branam (park dispatcher) and a friend treed and killed two 20-lb. kittens near Hillis Creek in the Greenbrier section of the Great Smoky Mountains National Park. Good description. Brother doubtful.
1970's—Photo of a black panther killed near Cosby, Tennessee, published in now defunct Newport, Tennessee, newspaper. Park ranger J. R. Buchanan and Mike Pelton examined fresh specimen and said it was a large house cat. It was mounted and displayed anyway.
1971—Mr. Buckner of Decherd, Tennessee, killed one north of Crossville while deer hunting. Mount has no Florida panther pelage characteristics. Toenails not visible on four main toes, so may be former captive. Skull is in mount, but Buckner will not allow it to be measured.
1981—April Fool's Day article in small newspaper in Linden, Tennessee, was obvious hoax.
1981—Rumor of one being killed in southwestern Tennessee near Bolivar in late April was a hoax.

Kentucky

1960—Jenkins (1971) cites Tramel (personal communication) that one was killed and photographed near Central City, Kentucky. Rumored to have escaped from a roadside zoo.

South Carolina

1916—Golley (1966) mentions one killed near Camden.
1942–43—Sass (1954) tells of one being hit and killed by a truck driven by Alan G. Broun, Jr., in Georgetown County. So large that it was difficult to drag by its long tail.
1952—Sass (1954) lists one found mangled in road by Benjamin by M. Badger, of Charleston. Also difficult to drag by long tail. Neither specimen was preserved.
Early 1960's—Downing talked with a man who, while living near Seneca, killed cougar (judging from good description) that was catching chickens from a tree in his yard.
1961—Beaufort paper mentions one killed.
1979—Black panther reported killed near Central turned out to be house cat.

TABLE 1.—Continued.

North Carolina

1900—David Lee's files contain good report of one trapped in a pocosin in Craven County.
1908–09—Culbertson (1977) talked with a Rev. Conrad who said a friend of his killed an adult and two kittens near Tines Creek, Big Cataloochee area of the Great Smoky Mountains National Park.
1913—Hutchinson (1979) mentions one being killed in the Great Smokies near Bryson City.
Early 1930's—Mr. and Mrs. McCall told Downing they saw one alive repeatedly; it was then killed on Waterrock Knob near Addie, in Jackson County. Good description. Could be the Bryson City specimen above.
1949—Lee's files contain report of a cougar killed in a pocosin in Pitt County. Low credibility.
1950—Lee's files contain report of cougar killed in Tyrrell County.
1952—Dewalt Hyde reports one killed near Robbinsville.
1959—Eaton (1973) says a 79-lb. male was killed on Horse Face Mountain in Cherokee County, N.C.
1966—Lee's files contain a secondhand report of one killed off Highway 321 between Blowing Rock and Lenoir. Lee gave report a low credibility rating.
Late 1960's—Lee's files contain report of cougar killed in Green Swamp.
1970's—Secondhand report to Downing of one being killed and carcass thrown off road between Bat Cave and Black Mountain.
1975—Brevard man told Dick Brown and Downing that he killed one that was molesting his hogs. The only bones found near where he left carcass were dog.
1978—Cougar shot and sold for $100 near Robbinsville.
1979—Skull from carcass that was thought to be cougar turned out to be bobcat.
Late 1970's—Boasted cougar kill in mountains investigated by David Allen; turned out to be a female African lion salvaged from a dumpster.
1980—Rumor of hunter killing cougar that stole his deer near Robbinsville.
1981—Bill Freeze and a neighbor saw and weighed (169 lb.) a large male killed February 4 by truck of unknown persons near Ellerbe in Richmond County. Specimen not recovered. Possible hoax.
1981—Danny Armstrong found skeleton near Brevard. Skull large enough to be cougar, but judging by telephoned description does not have proper dental formula; probably bobcat, but skull has since become lost.
1982—Skeleton found in road ditch was young African lion.

Virginia

1978—Unsubstantiated rumor of one being poached in Shenandoah National Park.

West Virginia

1950's—Larson (1966) mentions three hoaxes involving Mexican and western cougars.
1976—One killed and one captured had parasite loads and behavior suggestive of recent captivity.

Maryland

1913—Shoemaker (1917) mentions one killed a few miles north of Washington, D.C.
1920's—David Lee has photo and data on cougar kitten shot in Garrett County. Specimen now at the U.S. National Museum.

TABLE 1.—Continued.

Pennsylvania (reports compiled by Helen McGinnis)

1901—Shoemaker (1943) reported that Delbert Reynolds saw one caught in a trap and shot it in Tioga County.
1902—Shoemaker (1943) tells of a very old cougar being shot on Scootac (Tangascootac Creek? Clinton County) while attempting to steal hams at a lumber camp.
1903—Shoemaker (1943) tells of another cougar killed on Scootac by Earl Monaghan.
1905—Shoemaker (1917) lists a "doubtful newspaper report" for Clinton County but does not mention it again in the 1943 article.
Early 1900's—Charles Thomas, now deceased, told Bob Webber details of a cougar his relatives killed near Orviston and Monument.
1914—Shoemaker (1917, 1943) cites the *Lewisburg Journal* account of one being killed on Paddy Mountain (Union County?).
1916—Shoemaker (1917) listed two unconfirmed kills in Mifflin County, but may have determined that these were not reliable since they were not on his 1943 list.
1918—Niece of Willard Smoyer (deceased) told McGinnis of seeing mounted skin of animal her uncle had killed.
1921—Henry Masker told McGinnis he killed a young panther, and speculated that it escaped from a nearby circus.
1946—Carload of deer hunters, with 6-foot-long cougar tied to the fender, passed Robert Frazier between Snowshoe and Renova.
Late 1940's—Game protector Theodore E. Carlson (now deceased) shot cougar, probably in Elk County, and told two fellow employees. One of them saw the skin.
1940's—Captive cougar escaped near Kane and was shot by state patrolman several miles away.
1967—Small (48 lb.) young adult female killed by John D. Gallant near Edinboro. Specimen (Carnegie Museum #59525) described by Doutt (1969). Deformities suggest former captivity. Larger companion escaped.
1984—Carcass reported to Stan Gordon was a dog.

Massachusetts

1927—Leo Daly has photo of one killed in Shutesbury. Reportedly had a tufted tail but is obviously a cougar.

Maine

1906—Jackson (1922) mentions a kill near Mount Kineo.
1915—One killed near South LaGrange (Wright 1972).
1938—One killed at Little St. John's Lake (Wright 1972).
1949—Skull of one killed this date submitted to Safari Club International.
1974—A truck driver told Virginia Fifield that his uncles killed two cougars, including a 220-lb. male, near Rangeley.

Ohio

1966—McGinnis files mention a tame cougar shot the day after it escaped.
1960's—East (1979) mentions young cougar killed by car near West Virginia line.

Wisconsin

1903—Jackson (1961) listed one killed in Barron County.
1908—Jackson (1961) listed one killed in Douglas County.

FIG. 1.—A track found in a mudpuddle in West Virginia. It has many characteristics of a cougar, but is not distinct enough to identify with certainty.

which groups of sightings are most likely to contain "true" reports when the "fog" of false reports in an area that actually contains cougars may approach 90 percent? Unless several of the sightings are reported by persons of proven ability, there is no way to tell the promising areas (nine of 10 are mistaken) from the unpromising ones (10 of 10 are mistaken).

Audubon and Bachman (1851: 309), after recounting several reports of cougar attacks on people, said these ". . . must be received with some caution, making due allowance for a natural disposition in man to indulge in the marvelous." I am not aware that any of the reports I have received were purposely fabricated or embellished, yet I am intrigued by the tendency of witnesses who get only a fleeting glimpse of an animal to make a split-second interpretation that it was the rarest animal in the East (a cougar), rather than a common one (dog or deer). Several individuals have told me that their first identification of an approaching animal was dog or deer, and that they had to change that impression as the cougar came closer. To these cases, I assign a high probability of accuracy. I also assign a high probability to those few cases (less than half a dozen) in which the witness told me about seeing the tail flicking, since this is a behavior that is seldom publicized. Most people apparently know that a cougar's tail is carried low and turns up at the end, so it's not surprising that a majority of reports contain this detail. Some black animals, such as Labrador retrievers, are reported to be black

FIG. 2.—Track in snow of a long-tailed cat flushed from a tree in West Virginia. If some of the heel pad was subsequently covered with snow, this would be an authentic cougar track (photo: Jim Rawson).

panthers because that's the color that panthers are supposed to be, according to folklore (the Asian "black panther" is actually a melanistic leopard).

I regard reports of cougar screams as the least reliable evidence. House cats, bobcats, foxes, owls, and others can make the woods ring with sounds on a still night. Three people have sent me tape recordings of screams, and they all sounded exactly like grey foxes barking. People often hear a sound that is unfamiliar to them and, instead of associating it with a common animal, they report it as the rarest of all, the cougar. However, one person heard my tape of a cougar in heat, and said it sounded exactly like screams that she had heard in Maine.

In many instances, people found tracks and reported them as being those of a cougar, although the animal was not seen (Fig. 1). In more than 60

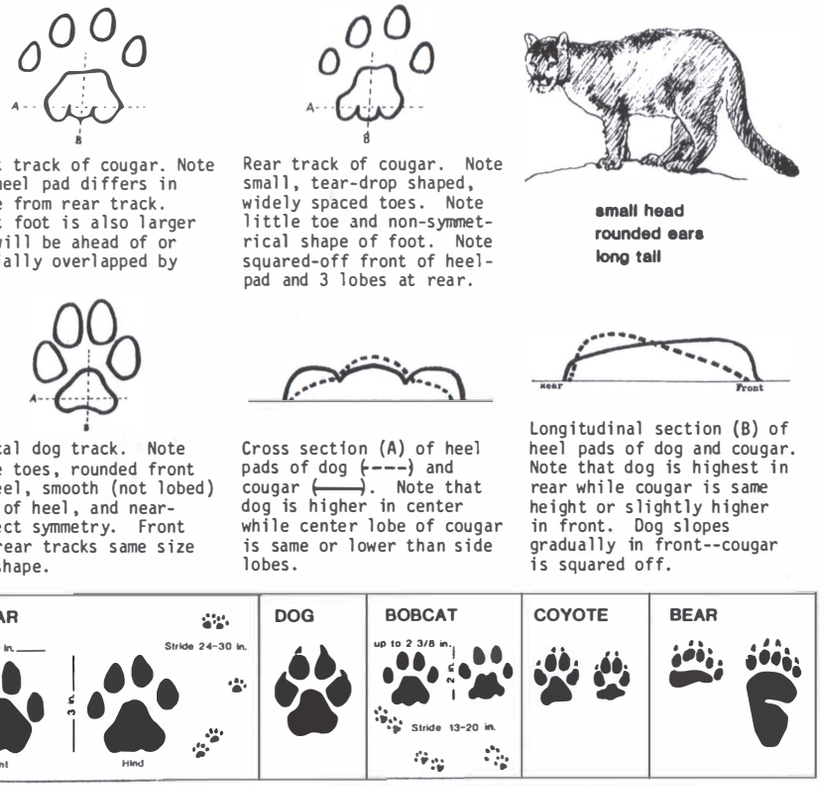
Front track of cougar. Note how heel pad differs in shape from rear track. Front foot is also larger and will be ahead of or partially overlapped by rear.
Rear track of cougar. Note small, tear-drop shaped, widely spaced toes. Note little toe and non-symmetrical shape of foot. Note squared-off front of heel-pad and 3 lobes at rear.
small head
rounded ears
long tail
Typical dog track. Note large toes, rounded front of heel, smooth (not lobed) rear of heel, and near-perfect symmetry. Front and rear tracks same size and shape.
Cross section (A) of heel pads of dog (----) and cougar (——). Note that dog is higher in center while center lobe of cougar is same or lower than side lobes.
Rear
Front
Longitudinal section (B) of heel pads of dog and cougar. Note that dog is highest in rear while cougar is same height or slightly higher in front. Dog slopes gradually in front--cougar is squared off.
COUGAR
3 1/2 in.
Stride 24-30 in.
3 in.
Front
Hind
DOG
BOBCAT
up to 2 3/8 in.
2 in.
Stride 13-20 in.
COYOTE
BEAR

FIG. 3.—Diagrams of tracks of cougars and other animals easily confused with them were circulated widely.

instances where I saw a suspected cougar track (or a photo or cast of one), all but four turned out to be of dog, bobcat, or bear, or were too indistinct to make a determination. The four remaining ones (all photographs), from Pennsylvania, West Virginia (Fig. 2), Massachusetts, and Connecticut, look somewhat like cougar tracks. Both sites have been searched repeatedly by cooperators, and no additional cougar-like tracks have been found. I circulated about 1,000 diagrams and descriptions of cougar tracks (Fig. 3), and about 150 sets of plaster casts to familiarize key biologists and other interested persons with their characteristics. These were used to screen out many of the dog tracks before they reached me.

I cannot overemphasize the importance of *thoroughly* learning the difference between the tracks of dogs and cougars. A degree in wildlife biology is no guarantee that one knows the difference, and at least three prominent mammalogists have been mistaken in their track identification (evidence in my files). If these prestigious gentlemen could make such a mistake, so can

FIG. 4.—Covered deer kills such as this one are always the work of a large cat. Unfortunately, bobcats are also capable of killing, dragging, and covering a deer in the same manner as a cougar.

we all. In my opinion, it is far better to study plaster casts than to study drawings or photographs.

Several people sent me photographs of covered deer kills, and I myself saw six covered kills that had characteristics suggesting that a cougar was the predator responsible (Fig. 4). While nothing that I have found in the literature suggests that a bobcat is capable of dragging an adult deer, or reaching farther than 70 cm to obtain covering material, apparently some bobcats *do* have this ability, at least according to biologists to whom I offered this evidence for comment. Bobcats capable of these feats may be rare, but they probably are more numerous than the supposed cougars in the East; thus, such evidence is inconclusive, unless a good track can be found in the vicinity (Fig. 5).

Early in the study, I became aware of the potential for identifying the inhabitants of an area by chemical analysis of the bile steroids in their scats (Major et al. 1980), and I supported an effort to refine the technique. The method presently is not sufficiently accurate to be useful—29 percent of *known* bobcat scats were identified as cougar (Johnson et al. 1984). Scats larger than 30 mm in diameter and containing deer hair and bone (Fig. 6) provide sufficient reason to look for other sign, such as tracks; but scat size and composition in themselves are inconclusive evidence of cougar (Clinite 1981).

FIG. 5.—The author preparing a track plot in the vicinity of a covered deer kill, in an attempt to determine the kind of cat responsible.

SEARCHES FOR SIGN

Before the present study was begun in 1978, National Forest personnel in North Carolina enlisted the help of David Lee, of North Carolina State Museum, to compile and investigate cougar reports statewide (Lee 1977), and Dick Brown of the University of North Carolina at Charlotte to do a detailed analysis of reports from Uwharrie National Forest. Both investigators recommended further field searches for sign, and a professional cougar hunter from Colorado was brought in for a month in 1977 for this purpose. My own study was organized after this effort failed to provide positive evidence of the presence of cougars. The major strategy was to solicit and investigate fresh reports and to search for tracks in remote areas during snow. Snow was emphasized since many of the roads are paved, and dirt roads in the area seldom provide a useful tracking medium due to their hard, rocky composition.

Only one possible cougar track was found in snow (at Blue Ridge Parkway, North Carolina). The track had been covered with new snow, so the only clues were the long distance between tracks, and the fact that the animal had walked logs and wooden guardrails at every opportunity (Fig. 7). In one instance, it had jumped almost 2 meters from one log to another. The usual distance from track to track was similar to a bobcat's 40–50 centimeters, but when crossing the highway (several times) it had a distance of 65–80

FIG. 6.—Suspicious looking scat found in West Virginia which could not be positively identified.

centimeters, which is beyond the range of any bobcat that I have measured under similar conditions. However, repeated searches in the same area revealed only bobcats, and no more "long-stepping log-walkers."

Snow does not necessarily provide a good tracking medium. Snowfall in the Southern Appalachians, where I expended most of my effort, often occurs only at high elevations; and this usually is followed by several days of high winds and bitter cold. Deer usually move to lower elevations where it does not snow as often. They seem to do most of their feeding before and during the snowstorm, not in the fresh snow afterward. By the time they become active again, the snow normally has either blown away, melted, or developed a hard crust. Bobcat tracks are abundant in fresh snow, and I am told that cougars readily walk in snow, too, so I cannot explain why I have not seen cougar tracks.

Much of the dirt tracking I have done has been in the Piedmont and Coastal Plain. This is because conditions are rarely suitable in the mountains. Road surfaces are soft enough to register tracks in the mountains only during the spring thaws. At night, when cougars usually prowl, these roads usually freeze hard again, preventing further tracks and deforming those already present. Mid-summer dust is a rare commodity in the mountains due to the frequent severe thunderstorms. An indistinct track found in a mudpuddle in West Virginia, when considered with other evidence (nearby scat, sighting

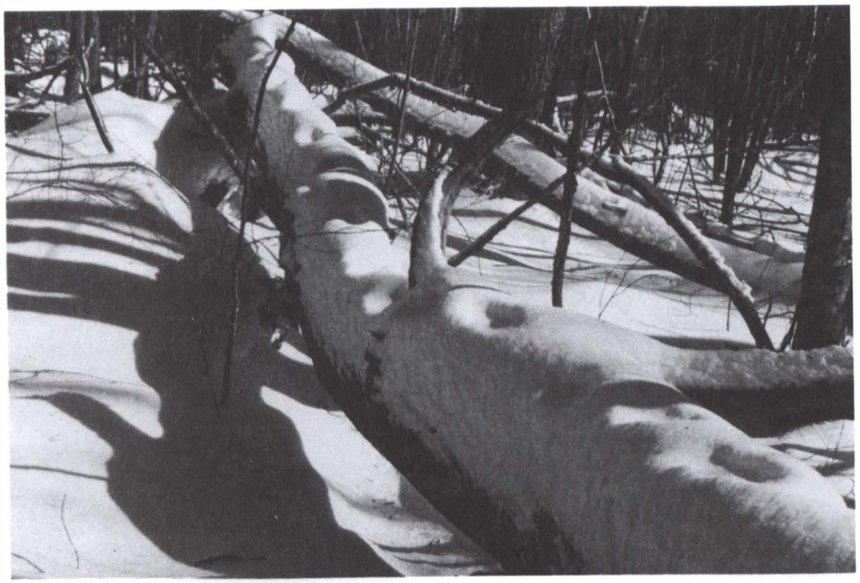

FIG. 7.—The characteristic saw-toothed pattern of tracks along snow covered logs is obvious evidence of a cat, but often the tracks are not distinct enough to tell which kind of cat was responsible.

by highly experienced biologist the year before, and recent predation on sheep), suggests the presence of a cougar there. However, a more distinct track will be needed to prove it.

Several western researchers and professional hunters have suggested that the most efficient way to determine if cougars are in an area is to look for their "scratch-hills," piles of leaf-litter that are scratched up and urinated upon by males. These scratch-hills may persist until the next leaf-fall, and therefore become more or less permanent testimony of the presence of a male cougar.

In many parts of the Appalachians, there are other species that disturb the leaf-litter and make what appear to be scratch-hills. Wild boar are perhaps the worst offenders, followed by bobcats, ruffed grouse, turkey, black bear, dogs, squirrels, skunks, and foxes. It is frustrating to search for scratch-hills in Great Smoky Mountains National Park, for example, because numerous wild boar have rooted the leaves into what looks superficially like a continuous series of scratch-hills. I have seen cougar scratch-hills in Florida and Colorado, and feel that, in paired comparisons, I can differentiate between these and hog rootings in most instances. Nevertheless, repetition tends to dull one's perceptions, and after a day of viewing several thousand hog rootings, it is possible that I could stumble over an intermingled cougar

scratch-hill without even noticing it. Except where there are boar, scratch-hill-like disturbances are uncommon enough to attract one's attention and arouse one's curiosity; but since bobcats occasionally make scratch-hills that overlap in size with those of cougars (Clinite 1981), such markings are not conclusive evidence of the presence of cougars.

Can it be said that an area that does not contain scratch-hills does not contain male cougars? According to discussions at the Mountain Lion Workshop (Nevada Fish and Game Department 1976: 89–90), there are cougar-occupied areas in the West where few, if any, scratch-hills can be found. One hunter, who had caught 31 cougars (or pumas or mountain lions as they are known in the West), had never seen a scratch-hill in the area; another who had caught 18 had seen no more than half a dozen scratch-hills. Areas with high-density, stable cougar populations generally have many scratch-hills, whereas exploited populations, composed mainly of transients and sub-adults, may not. Eastern populations, if they exist, are certainly low-density, and therefore may not be expected to contain many scratch-hills. If there truly was a cougar killed in Richmond County, North Carolina, February 4, 1981 (Table 1), North Carolina cougars do not make many scratch-hills. My wife and I spent six days during mid-February and early March walking out the likely travel-ways within five miles of the alleged kill site, and failed to find any evidence of cougars, past or present. A heavy rain had fallen between the kill date and our first visit, so tracks were not expected; but if the cougar was a resident, and had left abundant scratch-hills like the researchers elsewhere say they do, we should have found some. The function of scratch-hills is not entirely clear, but if it is to warn away neighboring males, there may be no incentive to mark if there is no neighbor.

Two behavioral traits noted in captive cougars may tend to conceal sign. Silvio Martinat, of Lenoir, North Carolina, has noticed that his captive cougars usually defecate while dipping their hindfoot in their water buckets. He interprets this behavior as a desire to defecate in water. Because there is much open water in the East, cougars would not have much difficulty hiding their scats. However, Chris Belden, of the Florida Game and Fresh Water Fish Commission, finds plenty of panther scats in Florida where water is accessible.

I once tried to get one of Silvio Martinat's cougars to walk through a mud-puddle that I had prepared. After daintily testing the wet area with its foot, the cougar, which was on a leash, could not be forced to step in the mud. If they normally act that way, we may have a problem; but Chris Belden feels that the behavior of captive cougars is seldom manifested in wild ones (personal communication). Belden has observed similar mud-aversion behavior in captives, but says wild ones do not hesitate to step in the mud. During the rainy season, wild Florida panthers actually have little choice.

Catnip has been used to attract cougars to camera sets or track plots by

Young and Goldman (1946). One reason I have not tried catnip is that I cannot find a source of strong-smelling catnip oil, and the synthetic products now on the market do not contain the proper compound, nepetalactone. Since catnip grows wild throughout the East, wild cougars here may not respond to it in any case. Several states have used urine-scented plots to monitor populations of bobcats and other predators, but none has reported cougar tracks in the plots.

Conclusions and Future Prospects

Despite several years of intensive effort funded by the U.S. government, the author has been unable to positively confirm that there are self-sustaining populations of cougars in the eastern United States north of Florida. I doubt that public agencies will fund further searches unless indisputable evidence is produced. As long as there are witnesses who claim to have observed cougars, however, there will be public demands that conservation agencies take special steps to protect cougars from the public—as well as to protect the public from the cougars. At one point, the U.S. Forest Service was actually threatened with litigation if it did not halt timber harvesting on a 29,000 ha tract of land, and it would not be surprising if, in the future, petitions were made to close the hunting season in those counties in which cougar sightings are reported.

Public agencies have adopted the defensive attitude that they will not consider such radical measures until breeding populations of cougars have been proven to exist. All that I have been able to prove in six years of effort is that proof of their existence is difficult to obtain. One may wonder what resource management agencies would do if the courts were to begin accepting eyewitness reports submitted by the agencies' antagonists as proof of the cougar's present existence. As most readers of this journal are already aware, "non-occurence" is virtually impossible to prove conclusively, so there is probably little that resource management agencies could do to counter such measures. In this connection, an article to be submitted to *Cryptozoology* (Guynn, Downing, and Askew, in preparation) addresses the theoretical aspects of calculating the "probability of non-detection." Readers are urged to test this theory, when it is published, on various cryptic animals, in order to determine its practical utility.

The future prospects of demonstrating conclusively that breeding populations of cougars exist in the eastern United States are not good. Most of the evidence is questionable at best. Some of the evidence is strong, particularly sightings by trained biologists or conservationists, but it is insufficient in itself as proof. The animals, if they exist, must be rare, elusive, difficult to track, and do not maintain breeding territories. The matter will probably remain unresolved until definite kills, substantiated by evidence that the animals in question were not released pets, convince biologists and conservation agencies that the cougar exists and breeds in a wild state in the eastern United States.

As to which subspecies would be involved, that is a matter which can only be resolved at that time. Three possibilities actually exist: 1) the persistence of the original *Felis concolor couguar* subspecies (meaning complete extinction in the East did not occur); 2) migration of other subspecies from the West or from Florida; or 3) individuals or groups of individuals released into the wild and now breeding (such releases may have occurred at different times in different places and may have involved different subspecies, perhaps even some non-U.S. subspecies). To complicate matters further, any combination of these three possibilities may, in fact, be occurring, as they are not mutually exclusive.

Thus, the controversy cannot be laid to rest simply by officially declaring that the original subspecies is extinct. The ninety percent (or more) of the people who mistakenly report seeing cougars will continue to make the same sincere but mistaken reports, undaunted by official proclamations. Even if all biologists became convinced that there are no wild cougars in the East at the present time, there is the distinct possibility that an illegal introduction or a dispersing pair of another subspecies from Florida or the West could perpetuate the controversy at some future time. Conversely, if a few wild cougars could be confirmed today, they could all die tomorrow due to poaching or disease. If the presence or absence of cougars was as easy to determine as some investigators think, there would be no problem, and we could monitor their status from one place to another on a continuous basis.

I must conclude, unless we accept the unlikely possibility that *everyone* who reported seeing a cougar in the East was mistaken, that the animal has existed in small numbers in several areas at least within the last ten years. I do not know if it still exists at the present time, although reports continue to come in, and I cannot say if it will exist at some future time.

This situation is one with which those involved in other aspects of cryptozoology are familiar. In fact, if it is ultimately demonstrated that wild cougar populations exist in the East—and may have existed all along—this would have serious implications for other areas of cryptozoology. If it was so difficult to prove the existence in one area of an animal already very well known and studied in another area, how much more difficult must it be to prove the existence of other cryptozoological animals, which are perhaps even more elusive and of which practically nothing is known. Cryptozoologists working on other problems should thus take heart that the eastern cougar has not yet been proven to exist: it adds weight to their own cases by demonstrating, despite all arguments to the contrary, that it is very difficult to locate rare, elusive animals in wilderness areas.

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